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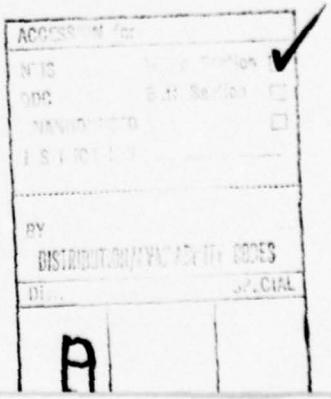
ABSTRACT

These abstracts provide a synopsis of research projects conducted by dental officers enrolled in the first-, second-, and third-year residency programs at the National Naval Dental Center, Bethesda, Maryland, during the academic year 1976-1977. The projects were completed in partial fulfillment of the requirements of the programs.

The opinions and assertions contained in these abstracts are the private ones of the writers and are not to be construed as official or as reflecting the views of the Department of the Navy.

Animals used in the studies were handled in accordance with the "Guide for the Care and Use of Laboratory Animals" prepared by the Committee on Revision of the Guide for Laboratory Animal Facilities and Care, of the Institute of Laboratory Animal Resources, National Research Council.



CONTENTS

ABSTRACTS OF FIRST-YEAR REPORTS

CONTENTS (cont'd)

No. 1

CLINICAL EVALUATION OF COMBINED FREEZE-DRIED ALLOGRAFTS/AUTOGENOUS BONE GRAFTS IN PERIODONTAL OSSEOUS DEFECTS

J. J. Sanders

As part of an ongoing study, military and civilian periodontists were asked to evaluate freeze-dried cortical bone allografts when used alone and in combination with various types of autogenous bone. Wide three-wall, two-wall, one-wall, combination, and furcation defects were grafted and the sites evaluated for pocket reduction and osseous regeneration. Reentry surgery was carried out to verify osseous regeneration. Bony regeneration and pocket reduction were rated as complete, greater or less than 50%, or failure. A total of 272 defects were grafted with freeze-dried bone alone. Of these defects, 171, or 63%, exhibited complete or greater than 50% osseous regeneration: 178, or 65%, exhibited complete or greater than 50% pocket reduction. Forty-five defects were grafted with freeze-dried plus autogenous bone. Of this group of defects, 36, or 80%, exhibited complete or greater than 50% osseous regeneration; 38, or 84%, exhibited complete or greater than 50% pocket reduction. When these results were compared to those for freeze-dried bone alone, borderline significance was found for both osseous regeneration and pocket elimination. For freeze-dried grafts alone, complete wound closure and the presence of a non-endodontically treated tooth each appeared to be significant when considering success. From the data available, there is strong evidence that freeze-dried bone can be used successfully in the treatment of certain periodontal osseous defects. Preliminary data indicate that combination grafts appear to be superior to pure freeze-dried grafts. Final determination will await the outcome of larger numbers of cases.

No. 2

A COMPARATIVE STUDY OF REMOVABLE PARTIAL DENTURE FRAMEWORKS UTILIZING THE VACUUM-CASTING AND CENTRIFUGAL TECHNIQUES

S. J. Ancowitz and J. J. Shanley

Although the vacuum-pressure method of casting permits easy escape of gases and reduces turbulence of the molten metal to be cast, few studies have been reported on the use of this method in casting stellite alloys. The purpose of this study was to compare the accuracy of the centrifugal and vacuum-pressure methods in casting dental stellite alloy. A metal die was designed and constructed to simulate a dental arch. Five reference points were inscribed on horizontal ridges, of which two were placed in the opposing quadrants in the molar area, two in the bicuspid area, and a fifth in the region of the incisors. Refractory casts were obtained by fabricating a duplication of the metal die. Each

cast was measured under a binocular measuring microscope. Measurements were made from the molar region of one quadrant to the molar region in the opposing quadrant, from one bicuspid region to the opposite bicuspid quadrant, and from the molar region of the right quadrant to the anterior reference point. Castings were made with nickel-chrome alloy and the metal was melted with oxygen-propane. Measurements of the castings were made using the same procedure as was described for the refractory casts. Comparisons between measurements of the refractory casts and the resultant castings showed significant differences, regardless of the casting method used. Comparisons between castings fabricated by the centrifugal and vacuum-pressure techniques showed no significant differences. Our findings suggest that laboratories might be able to utilize the inexpensive and simple vacuum-pressure method of casting removable partial denture frameworks, but our study is continuing in an effort to validate this assumption.

No. 3

A COMPARISON OF RESIN RESTORATIVE SYSTEMS FOR MARGINAL MICROLEAKAGE WHEN USING THE ACID-ETCHED TECHNIQUE

T. D. Carlson and J. R. Ponsler

Microleakage at the margins of dental restorations can contribute to pulpal irritation and to the development of recurrent carious lesions. It has been postulated that composite microleakage might be reduced by cavosurface bevel preparations and by application of a surface sealing (glaze) layer of unfilled resin, but supportive evidence is lacking. The purpose of this study was to evaluate whether these procedures may have an effect on microleakage of acid-etched composite restorations. Class V cavities were prepared in 70 extracted human molars for four different types of composite materials (CONCISE, ADAPTIC, NUVA, and RESTODENT). Thirty-five samples, each restored with one of the materials, were prepared with a cavosurface margin finished to a 90^{o} angle (butt-joint) and the other 35 samples finished with the margin beveled to about a 45^{o} angle. Half of the prepared teeth were then treated with a surface glaze layer and the other half were left unglazed. After thermocycling, and immersion in radioactive calcium chloride solution, audioradiographs were used to determine leakage. In the case of the autopolymerizing composites with BIS-GMA bonding agents (ADAPTIC, CONCISE), no leakage was found regardless of technique used. For the composite (NUVA) polymerized with ultraviolet light, it was found that either the bevel or the glaze was necessary in order to obtain an acceptable restoration. RESTODENT, like NUVA, leaked excessively in the control group (no bevel, no glaze), but showed no leakage if a beveled preparation was used.

No. 4

DECONTAMINATION OF DENTAL LABORATORY PUMICE

R. L. Curry and B. B. Peterson

Dental laboratory pumice is frequently used to polish prostheses that have been worn by patients. This process may contribute oral debris containing microbial contaminants to the pumice, which could result in cross-contamination and infection. There is a need to find an effective means of decontaminating the pumice. A study was undertaken to evaluate the effectiveness of a 2% alkalinized solution of glutaraldehyde (CIDEX) for decontaminating dental laboratory pumice. Samples of pumice from heavily contaminated trays in routine clinical use (each gram of wet pumice contained as many as 4 billion microorganisms), were treated in separate tests with either 50 ml or 100 ml of alkaline glutaraldehyde solution, adjusted to a pH of about 7.5. The slurry was assayed for microbial content at times after exposure of 1 hour and 24 hours, and every 24 hours for a period of 1 week. Under normal clinical conditions, the high level of contamination was usually maintained except when the pumice dried out; but upon the addition of water, the contamination levels would again increase to maximum levels after several hours of incubation. Predominant types of microorganisms recovered were gram-negative rods and gram-positive cocci. The test results showed that both amounts of glutaraldehyde solution effectively reduced maximum microbial concentrations of pumice to less than 100 microorganisms per gram wet pumice in about 1 hour. The pumice trays remained at these low levels during clinical use for about 7 days.

No. 5

DITCHED AMALGAMS: AN IN VITRO STUDY OF MICROLEAKAGE

S. F. Johnson and L. D. McKinley

Dental amalgam restorations frequently tend to break down at the tooth-amalgam interface after prolonged service in the oral environment. These "ditched" restorations are generally assumed to be sealed by corrosion products and debris, but very few studies have been undertaken to investigate a relationship between marginal ditching and microleakage. The purpose of this study was to establish whether there is such a relationship, using extracted teeth containing amalgam restorations and a ^{45}Ca radioautograph technique. A total of 50 extracted human teeth with existing Class I amalgam restorations (43 with marginal ditching, and 7 without ditching) were employed in this study. Marginal defects were measured for width and depth with the measuring microscope. Each restoration was also graded for adequacy, using basic, accepted procedures of operative dentistry. The teeth were tested for microleakage, using the ^{45}Ca radioautograph technique of Phillips and others. Of the restorations with marginal ditching, 58% showed leakage, whereas only 14% of the nonditched controls leaked. The difference was of borderline significance. Differences were not significant for leakage results between restored teeth with large and small defects, nor between restored teeth with

overfill fracture and corrosion defects. The inadequate restorations showed a significantly greater incidence of microleakage and marginal ditching than the adequate restorations. The results of this study indicate that restorations prepared in accordance with accepted principles of operative dentistry are less likely to demonstrate marginal ditching and microleakage than restorations prepared where these principles are ignored. Thus, the dentist should be suspicious of ditched amalgam restorations and their continued usefulness in the oral environment.

No. 6

THE EFFECT OF THREADED PINS ON THE SHEAR STRENGTH OF CLASS IV ACID-ETCHED COMPOSITE RESTORATIONS

L. G. Herrman and J. H. Isaacson

In the repair of Class IV incisal fractures, acid etching of the enamel prior to restoration with improved composite resin systems may result in an increase in retention of the restoration. Because of this finding, many clinicians now question the need for retentive pins. Reports in the literature are conflicting as to whether pins strengthen or weaken the final restoration. This study was undertaken to evaluate the effect of a self-threading pin on the retention of an acid etched composite restoration. A total of 30 intact maxillary central incisors were cleaned with pumice, and prepared with similar Class IV cavity preparations on both the mesial and distal sides. A 45° angle bevel with a width of 1.0 mm was placed around each preparation, and a single TMS Minikin pin was placed in only one of the prepared sides on each tooth. Both sides on each tooth were acid-etched at the same time, restored with the same mix of composite, and shaped to form and contour. At time intervals of 30 minutes, 24 hours, and 7 days, a shearing force was applied to the lingual surface of each restoration until the tooth fractured. When shearing strength values of the restorations were compared statistically, no significant difference was found between acid-etched restorations restored with a single TMS Minikin pin and those restored without a pin. A significant difference was found however, between the force required to fracture the 7-day samples without pins and the forces of both the 30-minute and 24-hour samples without pins. Our findings support the belief that pins are not needed to increase retention when the acid-etch composite systems are used.

No. 7

THE EFFECT OF VARIOUS ABRASIVE DENTAL STONES ON THE SURFACE QUALITY OF A NONPRECIOUS METAL UTILIZED IN CERAMOMETAL RESTORATIONS

K. B. Bilger and Robert Moore

Examination of metal surfaces by scanning electron microscopy (SEM) suggests that porcelain should not be applied to nonprecious metal as it comes from the investment. Some type of abrasive surface preparation is needed. A need exists for a standardized technique of metal surface preparation that yields optimal porcelain bond strength and minimal porcelain crazing. The purpose of this study was to evaluate the effect of various metal preparation techniques on the surface quality of nonprecious metal prior to porcelain application. After initial preparation with the abrasive air eraser and ultrasonic cleaner, Ticon castings were prepared with either an aluminum oxide wheel, rubber point, Mizzy heatless wheel, or diamond stone. The resultant surfaces were then evaluated for surface contamination with foreign particles under the SEM at magnifications of 50 X, 200 X, and 500 X. Microtopography and contamination of the metal surfaces were then reevaluated after degassing and again after re-treatment with the abrasive air eraser. The findings of this study indicate that whatever preparation technique is used, the metal surface should be treated subsequently with an abrasive air eraser and aluminum oxide powder to ensure a uniform surface with minimal contamination prior to porcelain application. The study is continuing for a second year to determine a relationship between porcelain craze line propagation and metal surface irregularity.

No. 8

THE EFFECT ON A HIGH COPPER AMALGAM OF ALTERING MIXING TIMES AND MERCURY/ALLOY RATIOS

R. F. Harring and C. R. Ingle

A recently introduced high copper spherical alloy has attracted attention as an improvement over the conventional mercury/amalgam alloys because of its superior physical properties, but the lack of uniform appearance in fresh mixes has created a problem. There has been some question as to whether existing criteria for judging the appearance of freshly mixed conventional amalgams can also be applied to the high copper spherical alloys. Therefore, 87 specimens of high copper alloy (Sybraloy) were prepared and tested according to American Dental Association Specification Number one, to determine the effect of two of these criteria, mixing times and mercury/alloy ratio, on diametral tensile strength. Subjective observations were also made of the specimens, applying the criteria suggested by earlier workers. Mixing time was found to have no significant effect on diametral tensile strength except for specimens that had been undertriturated (10 sec). An increase

in the mercury/alloy ratio did not affect the diametral tensile strength as long as excess mercury was expressed. The appearance of freshly mixed amalgam declined before diametral tensile strength decreased. It was concluded on the basis of these findings that the operator should be guided by appearance in judging a fresh mix of high copper amalgam. If, for example, the mix appears smooth and shiny and can be imprinted, it is acceptable. The working time for the high copper alloy was found in this study to be acceptable for clinical use and comparable to that of other commonly accepted dental amalgams. Factors to be considered when selecting mixing times are differences between amalgamators, the amount of alloy to be mixed, and the size and weight of the mortar and pestle.

No. 9

THE EFFECTS ON MICROLEAKAGE OF INTERMIXING INTERMEDIARY BASE MATERIALS AND RESINOUS CAVITY VARNISH

G. H. Larson III and G. N. Moyer

When a resinous cavity varnish is placed in a cavity preparation containing an intermediary base, a viscous material is produced clinically that tends to cover the walls and margins of the cavity preparation. It has been speculated that this condition may contribute to leakage. The purpose of this study was to investigate whether the intermixing of bases and varnish in extracted human teeth would have an effect on microleakage. Class V preparations were placed in a total of 64 posterior teeth. They were based with either a calcium hydroxide or a zinc oxide-eugenol base material covered with cavity varnish; or they received no base and no varnish; or cavity varnish only. After the placement of amalgam, all specimens were stored in a moist atmosphere, and subsequently immersed in a ^{45}calcium chloride solution and processed according to the autoradiographic technique described by Phillips, et al. The autoradiographs were then evaluated for microleakage. None of the 20 specimens of the control group (varnish only) leaked; 11 of the 20 calcium hydroxide and varnish specimens leaked; all 20 of the zinc oxide-eugenol and varnish specimens leaked; and all 4 of the preparations with no base and no varnish leaked. Comparisons made with the controls for leakage showed significant differences for both the calcium hydroxide and varnish group and the zinc oxide-eugenol and varnish group. Our results indicate that when the product of intermixing is allowed to remain on the walls and margins of preparations based with either calcium hydroxide base or zinc oxide-eugenol base, we may actually be increasing the chance of microleakage.

No. 10

AN EVALUATION OF THE PORCELAIN-COMPOSITE BOND STRENGTH IN THE REPAIR OF FIXED PARTIAL DENTURES

D. M. Lewis and T. F. Styrlund

Porcelain fractures in fixed partial dentures can present a major problem when they occur. Recently, a dental manufacturer introduced a repair system with a bonding agent designed specifically for repair of porcelain fractures. This material is claimed to establish a chemical bond with porcelain. If a chemical bond is actually formed, it could solve the retention problems encountered with previous types of repair materials. The purpose of this study was to evaluate the bond strength of this new material in repair of fixed partial dentures using a tensile force testing method. The composite porcelain repair materials tested in this study were Den-Mat and Adaptic (control). A total of 60 denture teeth were mounted in acrylic, cut with a diamond saw, and roughened with a diamond wheel. To each of these surfaces was attached a cylinder of the composite material. The finished samples were stored in water at room temperature and subjected to tensile testing for bond strength at 24 hours, 30 days, and 30 days after thermocycling. The bond strength of the Den-Mat material was found to be significantly greater than that of the Adaptic control. The bond was 50% stronger at 24 hours, 140% stronger at 30 days, and 270% stronger at 30 days after thermocycling. Although Den-Mat was found to produce a superior bond, we cannot, because of the considerable variation in bond strengths, endorse its use at this time. Further testing is also needed on other properties.

No. 11

AN EVALUATION OF THE SOLVENT ACTION OF VARIOUS MEDICAMENTS ON ROOT CANAL SEALER

J. A. B. Hadman and R. A. Scudder, Jr.

Re-treatment of endodontically treated teeth, for pathologic or restorative reasons, is often necessary where silver cone obturation techniques have been employed. Successful re-treatment usually requires removal of the silver cone from the root canal system, which frequently leads to fracture or perforation of the crown and/or root of the tooth. Softening of the surrounding sealer before retrieval of the cone is attempted would provide a method that is easier and less traumatic to the patient. The purpose of this study was to evaluate the solvent action of various intracanal medicaments and solutions on root canal sealer for ease of retrieval of silver cones from dentin. Eugenol, camphorated monoparachlorophenol (CMCP), cresatin, xylene, ethyl alcohol (95%), chloroform, formocresol, and water (control), were selected for study as a result of preliminary tests on set and aged samples of root canal sealer (Kerr). Samples, consisting of silver cones cemented in longitudinal sections of extracted human teeth, were exposed to the solvents for times of 5, 15, and 30 minutes and 24 hours. The force required to dislodge the silver cone from the dentin sample was measured

with a push-pull gauge (Chatillon). At all four exposure times, significantly less force was required to retrieve samples exposed to xylene than to any of the other solvents except CMCP, and CMCP showed significant results only for the 30-minute and 24-hour exposures. Because of the cytotoxicity of xylene, it is suggested that it be used for short duration at single appointments; and that CMCP be used for multiple appointment approaches where the solvent can safely be sealed in the pulp chamber for 24 to 48 hours.

No. 12
HUMORAL RESPONSE TO ENDODONTIC CEMENTS IN RABBITS

L. V. Crowley and W. W. Stuart

Root canal cements elicit a chronic inflammatory response, but it is not known whether this response is immmunologic in nature. A humoral immunologic response could either provide protection or result in a hypersensitive tissue-damaging reaction. The purpose of this study was to determine whether certain endodontic cements are capable of eliciting a humoral immunologic response in rabbits. A total of five New Zealand white rabbits were inoculated intramuscularly with solutions of either $Ca(OH)_2$, ZnOE, Procosol, or RC2B; or with control solutions of Freund's complete adjuvant. Serum was recovered and assayed for a humoral response, using the ring test and the Ouchterlony gel diffusion test. Preliminary results of two ring tests on each serum have shown all to be negative for the presence of humoral antibody. However, further tests, utilizing the Ouchterlony gel diffusion test and serum from rabbits challenged with increased concentrations of the cements, are currently in progress. If a humoral response that causes hypersensitivity can be demonstrated, then these cements would be contraindicated for use in contact with tissue.

No. 13
PERIODONTAL EVALUATION OF THE DISTAL OF MANDIBULAR SECOND MOLARS FOLLOWING THE REMOVAL OF IMPACTED THIRD MOLARS

S. G. Detsch

Ash et al. stated that extraction may worsen the prognosis of the adjacent second molars, owing to an increase in pocket depth and gingival recession. Several authors, however, dispute this finding. The current study was undertaken to clinically observe epithelial reattachment levels and periodontal pocket formation distal to second molars after third molar extraction, and to relate these findings to the state of oral hygiene, surgical procedures, and the preextraction anatomic third molar position. Examination of 95 third molar areas in 50 patients 15 to 54 years old (average age: 20 years) was made approximately 1 month prior to extraction and at 1, 3, and 6 months and 1 year post extraction. Sulcular depth from the free gingival margin to the epithelial attachment

was measured around each second molar at seven positions, using a Glickman periodontal probe. An eighth measurement was made from the distal marginal ridge to the free gingival margin. Oral hygiene groups were established initially using the Navy Plaque Index. Microbial plaque was monitored at each examination, using the Plaque Index (Silness and Loe, 1965). Although the number of cases examined was not large enough for a statistical analysis, the results suggested that oral hygiene in this age group may not play as great a role as other factors in determining the level of the epithelial attachment distal to the second molar post extraction. However, the preliminary data showed that oral hygiene may influence the final pocket depth. Investigation is continuing on this project in an effort to validate these preliminary findings with an increased number of cases.

No. 14
SERUM AND STIMULATED PAROTID SALIVARY IgA IN PATIENTS WITH HISTORY OF HERPES LABIALIS

C. L. Athey, Jr. and M. A. Weiskopf

Complications and recurrences of herpes virus hominis Type I (HVH) infection appear to be associated with a deficiency of herpes-specific IgA in serum. Controversy exists, however, as to the role of salivary versus serum IgA in the immunopathology of the infection. The purpose of this study was to establish this relationship by determining IgA concentrations of serum and stimulated parotid saliva in patients with a history of HVH. A total of 18 patients with a history of recurrent herpes infection and 21 healthy controls were used in this study. Parotid saliva, stimulated with sour balls, was collected with a Crittenden cup, and blood samples were taken via venipuncture. The Crittenden cup was installed over the parotid duct orifice, and unmixed parotid secretions were selectively collected. Serum and salivary IgA concentrations were determined by the radial immunodiffusion technique of Mancini, Carbonara, and Heremans. Tri-partigen normal plates were used for determination of serum IgA, and LC partigen low level plates were used for determination of salivary IgA concentrations. Reference IgA sera of known concentrations were used in both testings. When the results were statistically analyzed, no significant difference, nor any correlation, was found between serum and salivary IgA levels of the herpes and control patients.

No. 15

A STUDY OF VOLUMETRIC SHRINKAGE IN FILLED RESINS

R. C. Herrman and C. W. Lander

Several investigators have speculated that in composite restorations, the composition of the organic resin may be a factor in the formation of the tooth-resin interface gap. This has never been tested as an isolated variable. A study was conducted to determine whether a relationship exists between the percent composition of diluent monomer in the organic resin and the extent of volumetric shrinkage in filled composite resins. Volumetric shrinkage for samples of Adaptic, Concise, Concise Cap-C-Rynge, Prestige, and Simulate was calculated from hygroscopic measurements of the weight change during polymerization. Nuclear magnetic resonance (NMR) spectroscopy of the monomers was used to calculate the percent Bis composition of the various samples. The results showed that Prestige and Cap-C-Rynge contained significantly greater amounts of diluent monomer, and produced significantly larger volumetric shrinkages than the other materials tested. Volumetric shrinkage appeared to increase as the percent diluent monomer increased to 50%. Further research is required to determine the effects of particle filler size and shape on the volumetric shrinkage.

No. 1
CELL-MEDIATED RESPONSE TO ENDODONTIC CEMENTS

A. D. Campbell and R. D. Gear

Some endodontic cements have been reported to cause a severe inflammatory response in animals, but it is not known whether this response is due to a specific immune response or to a nonspecific inflammatory response. If the response is immunologic, it would also be clinically important to know whether the response is humoral or cell mediated. This study was undertaken to determine whether selected endodontic cements are capable of eliciting a cell-mediated response in guinea pigs. Set and ground RC2B, Proco-sol, calcium hydroxide, and zinc oxide-eugenol, in Freund's incomplete adjuvant and saline solution, were prepared for subcutaneous injection. Four guinea pigs were sensitized by injection of 1:30 dilutions of the test materials and a Freund's-saline control. Following challenge 14 days later, redness and induration of the skin were observed at 24 hours and peaked at 72 to 96 hours, which was suggestive of a delayed hypersensitivity response. Two sensitized and challenged guinea pigs were sacrificed, and oil-induced peritoneal exudate cells were collected and assayed in the presence of the test materials, a phytohemagglutinin (PHA) used as a positive control, and Freund's-saline used as a negative control for the production of migration inhibition factor (MIF) by sensitized T-cells. The migration of cells was inhibited in the presence of PHA, thus demonstrating MIF production. Migration was observed in the presence of the negative control and all test materials. The migration was greater in the presence of the test materials than in the presence of the negative control, suggesting not only the absence of MIF production, but the presence of lymphocyte derived chemotactic factor (LDCF) or a nonspecific chemotactic response to the test materials on the part of the host cells.

No. 2
A CLINICAL EVALUATION OF FLUID RESINS FOR FABRICATION OF DENTURE BASES

J. T. Kennard

Autopolymerizing resins have been shown to exhibit a greater degree of processing accuracy than heat polymerizing resins. However, they have not received wide acceptance because of the varied clinical results obtained by different investigators. The purpose of this study was to compare three commercially available autopolymerizing resins for processing accuracy. The most accurate of these would then be further evaluated in a clinical environment. The autopolymerizing resin acrylics selected were Vernon Benshoff's Pronto, Dentsply's TruPour, and Coe's Pour-n-Cure. Six dentures were processed for each product. Identical casts were made from a master mold and then used to make identical denture wax-ups from a

second master mold. These dentures were indexed for three-dimensional measurement, and eight measurements were made for each denture at the National Bureau of Standards. The wax-ups were then processed according to the manufacturer's directions and measured again at 24 hours. Pronto demonstrated a total percentage change of 0.36% ± 0.27%, with seven of the eight measurements showing shrinkage. TruPour gave a total percentage change of 0.40% ± 0.53%, with three of the eight values showing shrinkage. Pour-n-Cure gave a total percentage change of 4.1% ± 4.2%, with six of the eight values showing shrinkage. The direction of processing error varied for each product. The movement for Pronto was generally in one direction, which reflected uniform shrinkage. The error for Pour-n-Cure and TruPour was almost equally divided between expansion and shrinkage.

No. 3

CLINICAL EVALUATION OF THE "SWAB TIP" AS A SUBGINGIVAL PLAQUE CONTROL DEVICE

G. B. Groff and H. J. Towle III

Effective daily removal of bacterial plaque is essential in the control and prevention of periodontal disease, but most widely used methods are inadequate for removing subgingival plaque. A device called the Swab Tip has recently been introduced for this purpose, but no evaluation has been made to substantiate the claim. The effectiveness of the Swab Tip as a means for subgingival plaque control was evaluated in this study in 24 patients. The device consists of a replaceable working tip and handle. The tip is a small tuft of cotton twine, twisted in the end of a fine wire loop. A split mouth experimental design was used, with one side of the patient's mouth for use of the Swab Tip and the other side as the control. Teeth were evaluated at the start and finish of two 6-week experimental trials for gingival bleeding, gingival inflammation, plaque, and changes in pocket depth. Results on test teeth for two trial periods showed significant decreases in the bleeding index of 48% and 31%. Changes in gingival and plaque scores were of borderline significance but appeared to parallel observed changes in the bleeding index. Pocket depth reduction, although significant, was of little clinical relevance. The majority of the patients were able to effectively use the Swab Tip to cleanse isolated periodontal pockets, and reported that they would like to continue using the device on a daily basis. Clinical impressions suggest that the primary value of the tip may be in the maintenance of isolated periodontal defects, not in the control of generalized periodontal disease.

No. 4

THE EFFECT OF VARIOUS CLASPING SYSTEMS USED FOR DISTAL EXTENSION REMOVABLE PARTIAL DENTURES ON THE MOBILITY OF ABUTMENT TEETH

R. M. Rohen and O. C. Tebrock

Distal extension removable partial dentures have long been implicated in the increase in mobility and destruction of the supporting structures of the primary abutment teeth. The purpose of this study was to clinically evaluate the degree of tooth mobility produced by three clasping systems. The first is a cast circumferential retentive arm with distal rest and adequate lingual bracing. The second is an 18-gauge wrought wire retentive arm, distal rest, and adequate lingual bracing. The third is an I-bar cast infrabulge retentive arm, mesial rest, distal guide plane, and adequate lingual bracing. Patients selected for study required treatment with a mandibular removable partial denture. Mobility measurements were made with a force meter at weekly intervals for at least 1 month to establish an abutment tooth mobility for each patient. Following establishment of the mobility baseline, the first of the three removable partial denture clasping designs was inserted. Abutment tooth mobility was checked at weekly intervals for 1 month. Following 1 month of insertion, the first removable partial denture was removed and the abutment tooth was allowed to return to its original baseline mobility. The second and third removable partial denture clasping designs were inserted and removed following the same sequence. Results revealed an initial increase in abutment tooth mobility for all clasp designs, followed by a return to baseline mobility by the end of 4 weeks after insertion. No significant difference in abutment tooth mobility was noted when the three clasping systems were compared.

No. 5

THE PHYSICAL PROPERTIES OF REPEATEDLY USED NONPRECIOUS METAL ALLOYS IN FIXED PARTIAL DENTURE CASTINGS

D. A. Hesby and P. Kobes

Nonprecious metal alloys are often substituted for precious metal alloys in the fabrication of fixed partial dentures. Since the cost of nonprecious metals has increased, it would be economically advisable to reuse them in combination with new nonprecious metal as is currently done with precious metal alloys. However, the desired physical properties of an alloy should be maintained above minimum ADA specifications; otherwise, clinical failure of fixed partial dentures would result. The purpose of this study was to determine whether the physical properties of the nonprecious metal alloys were altered after repeated melting. A total of twelve castings for each of four generations were made and tested for the physical properties of tensile strength, percentage elongation, and Rockwell hardness. Following a comparison of the first, second, third, and fourth generations, it was determined that there was no significant difference between any of the generations for the physical properties tested. It was noted that the tensile strength fell well below the minimum ADA specification of 6,300 kg/cm2, but this may have been due to

the method of spruing or the pre-melt technique used. This study indicates that the metal can be reused for four generations with no alteration in the tensile strength, percentage elongation, and hardness (Rockwell). Further study is needed to evaluate other physical properties that were not tested. These include the modulus of elasticity, grain size, carbide spacing, coefficient of expansion, and yield strength. A study of the bond strength of porcelain to the metal after repeated casting should also be examined.

No. 6

THE USE OF WATER SOLUBLE BIOFLAVONOID-ASCORBIC ACID COMPLEX IN THE TREATMENT OF RECURRENT HERPES LABIALIS

G. T. Terezhalmy

A water soluble bioflavonoid-ascorbic acid complex has been used with success to repress capillary permeability and fragility in some viral infections; however, no studies have been reported on its effect on viral herpetiform lesions. The purpose of this study was to evaluate the efficacy of water soluble bioflavonoid-ascorbic acid complex in minimizing the clinical signs and symptoms associated with capillary changes in herpes labialis infections. A total of 50 episodes of recurrent Herpesvirus hominis were evaluated in this study. Twenty episodes were treated with a complex of 600 mg of water soluble bioflavonoids and 600 mg of ascorbic acid administered in equal increments three times daily, and 20 episodes were treated with a complex of 1,000 mg of water soluble bioflavonoids and 1,000 mg of ascorbic acid administered in equal increments five times daily. Ten episodes were treated with a lactose placebo. The regimens were maintained for 3 days following recognition of the initial symptoms associated with recurrent herpes labialis. The water soluble bioflavonoid-ascorbic acid complex was observed to reduce vesiculation and to prevent disruption of the vesicular membrane. The therapeutic measure was found to be most effective when initiated during the prodromal stage of the disease process. Optimum remission of symptoms was observed in 4.2 ± 1.7 days with the 600 mg dosage of the water soluble bioflavonoid-ascorbic acid complex. No adverse reactions were reported by any of the patients participating in this investigation.

ABSTRACT OF THIRD-YEAR REPORT

No. 1
AN EVALUATION OF THE CURE OF METHYL METHACRYLATE
BY THREE METHODS

W. D. GAY

The short curing time for methyl methacrylate in the heat platten press would make the press a valuable tool for use in the prosthetic laboratory if the quality of the final product is comparable to that produced by more common methods. This investigation was undertaken to compare the surface quality of methyl methacrylate cured by the heat platten press to that of the material cured by two common methods. Three rectangular prisms varying from 3 to 10 mm in thickness by 10 to 20 mm in length and a wedge-shaped sample varying from 0.5 to 2.0 mm in thickness were used for study. The samples were processed by boiling for up to 1 hour, by curing in a tank for 9 hours at 75°C, and by curing in a heat platten press at varying times and temperatures. Porosity was determined visually as being either absent, widely spread, or gross. Although no surface porosity was observed for samples cured by any of the three methods, widely spread and gross internal porosity was noted in the larger samples ($>$ 3 mm in thickness) cured by boiling on the heat platten press. Only the 9 hour, 75°C cure consistently yielded samples with no porosity, regardless of size. The findings of this study indicate that the heat platten press can be used for rapid processing of methyl methacrylate in the prosthetic laboratory.

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These abstracts provide a synopsis of research projects conducted by dental officers enrolled in the first-, second-, and third-year residency programs at the National Naval Dental Center, Bethesda, Maryland, during the academic year 1976-1977. The projects were completed in partial fulfillment of the requirements of the programs.

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Ceramometal restorations
Copper alloy
Endodontic cement
Endodontic sealer
Freeze-dried bone
Herpes labialis
Nonprecious metal alloys
Periodontal pocket formation
Pin retention
Porcelain-composite bond
Pumice
Vacuum-pressure casting
Xylene